FOREST STATISTICS FOR THURSTON CO., WASHINGTON

FOREST SURVEY REPORT NO. 123

U. S. DEPARTMENT OF AGRICULTURE · FOREST SERVICE
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION
R. W. COWLIN, DIRECTOR

PORTLAND, OREGON OCTOBER 1955

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1/ Acknowledgment is made of cooperation from public and private agencies in furnishing cutting and ownership records.

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and
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U. S. Department of Agriculture Forest Service
Pacific Northwest Forest and Range Experiment Station

R. W. Cowlin, Director
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FOREWORD

This publication summarizes in statistical form the results of a reinventory of the forests of Thurston County, Washington, conducted in 1954. This reinventory is a part of the maintenance phase of the Forest Survey, a nationwide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928 and amended June 25, 1949. The purpose of the Forest Survey is to periodically inventory the extent and condition of forest lands and the timber and other products on them, to ascertain rates of forest growth and depletion, to estimate present consumption of timber products and to analyze and make available in reports survey information needed in the formulation of forest policies and programs.

The Forest Survey is conducted in the various forest regions of the Nation by the regional forest experiment stations of the Forest Service. In the Pacific Northwest region of Oregon and Washington it is an activity of the Pacific Northwest Forest and Range Experiment Station at Portland, Oregon.

Under the initial phase of the Forest Survey the forests of Thurston County were inventoried in 1932. A statistical report "Forest Statistics for Thurston County, Washington" and a detailed forest type map on a scale of 1 inch to the mile were released. In 1939 the first reinventory of the county's forests was made and a revised statistical report and forest type map prepared.

Following the second reinventory in 1954 the forest type map has been revised again and is available on a scale of either 1 or 2 inches to the mile. 1/

1/ A print of the forest type map is available at cost of blueprinting. For information write Director, Pacific Northwest Forest and Range Experiment Station, P.O. Box 4059, Portland 8, Oregon

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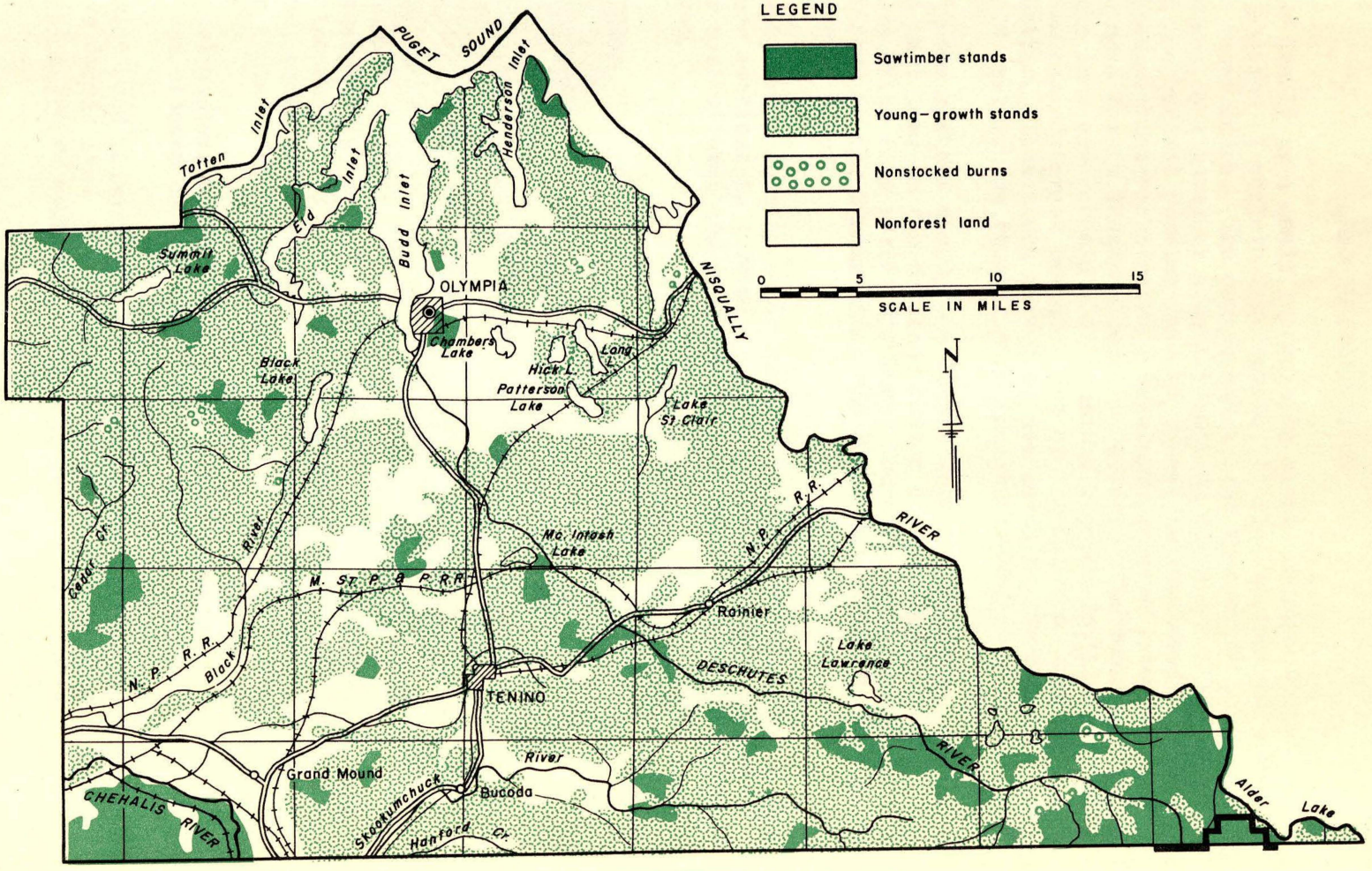
FIGURE 1

FOREST STAND-SIZE AND CONDITION CLASSES

THURSTON COUNTY, WASHINGTON

1954



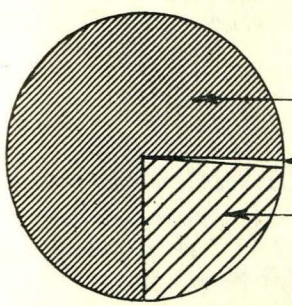
SIGNIFICANT FINDINGS IN THE FOREST INVENTORY

LAND CLASSIFICATION

Thurston County is a small irregularly shaped county located in the central portion of western Washington. It lies at the southern extremity of Puget Sound. The county has a land area of 467,600 acres. About 70 percent is a level or slightly rolling plain extending diagonally through the central portion from northeast to southwest. This plain is dotted with numerous natural treeless prairies from less than a hundred to more than a thousand acres in extent. The remaining 30 percent of the land area consists of moderately rough foothills of the Coast Range in the northwest portion, and of the Cascade Range in the southeast portion. Elevations vary from sea level on the Sound in the north to 3,000 feet on the foothills in the southeast.

Two drainage systems divide the county into nearly equal parts. The northern part lies in the drainage basins of the Nisqually and Deschutes Rivers which flow north into Puget Sound while the southern part is tributary to the Skookumchuck and Black Rivers which flow south into the Chehalis River.

White settlement came as early as 1840 to the northern part of the county. Since settlement, a fourth of the county's acreage has been improved for agricultural and urban uses, and three-fourths has remained as forest land.



CLASS	THOUSAND ACRES	PERCENT
COMMERCIAL FOREST	352	75.3
NONCOMMERCIAL FOREST	1	0.3
NONFOREST	114	24.4
TOTAL	467	100.0

Land presently in agricultural use totals 97 thousand acres. This includes 57 thousand acres of cropland and 40 thousand acres of pastureland. Natural grass and brush cover 3 thousand acres and urban areas and highways account for 14 thousand acres.

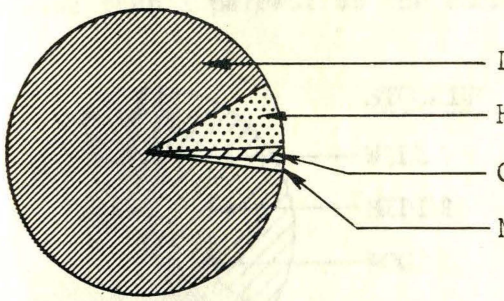
In the reinventory all of the forest land in the county except 1,310 acres was classed as commercial forest land.

The forest land classified as noncommercial consists of 1,150 acres of productive forest land in a reserved status in municipal and State parks, and 160 acres of unproductive forest land covered with a scrub-oak type.

COMMERCIAL FOREST LAND AREAS

Major Types

Douglas-fir is the only coniferous forest type in the county of any significance. Over much of the area it forms pure or nearly pure stands. Where it occurs in mixed stands its principal associates are western hemlock, western redcedar, and red alder. Other coniferous types are limited in area and are mainly western hemlock, western redcedar, and lodgepole pine.

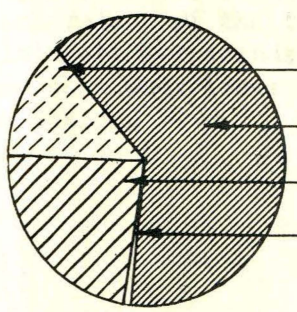


MAJOR TYPE	THOUSAND ACRES	PERCENT
DOUGLAS-FIR	323	91
HARDWOODS	25	7
OTHER	2	1
NONSTOCKED	2	1
TOTAL	352	100

The hardwood types are found on the more moist sites. They occur largely on the bottomlands along the Nisqually, Skookumchuck, Deschutes, and Black Rivers. Narrow stringers of hardwood occur along the smaller streams. Most of the hardwood types have as their principal species red alder. Less frequently, bigleaf maple or northern black cottonwood are the principal species in the type. In most cases these species as well as Douglas-fir occur as secondary species to red alder.

Stand-Size Classes

A long history of timber harvesting operations has materially influenced the stand-size class distribution in the county. Coniferous sawtimber-size stands occur on 47 thousand acres or 13 percent of the commercial forest area in the county. Of this area the stands on 20 thousand acres were classified as "large sawtimber," i.e., most of the volume is in trees more than 21 inches d.b.h.; stands on 27 thousand acres were classed as "small sawtimber" trees from 12 to 21 inches d.b.h.

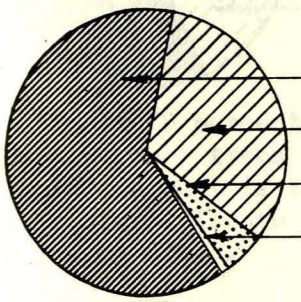


STAND SIZE	THOUSAND ACRES	PERCENT
SAWTIMBER	47	13
POLETIMBER	222	63
SEEDLING & SAPLING	81	23
NONSTOCKED	2	1
TOTAL	352	100

A very large part of the combined acreage of poletimber and seedling and sapling stands represents restocked logged land. A small portion of the acreage is restocked burns. Despite an intensive logging history, most of the areas have restocked with only 2 thousand acres remaining nonstocked.

Stocking of Young-Growth Stands

Most of the young-growth stands are adequately stocked. Over 95 percent of these stands, which include the young-growth sawtimber, poletimber, and seedling and sapling classes, are medium to well stocked. There is only a relatively small area in the county with poor stocking and less than 1 percent of the commercial forest area is nonstocked.



STOCKING CLASS	THOUSAND ACRES	PERCENT
WELL	219	62
MEDIUM	116	33
POOR	13	4
NONSTOCKED	2	1
TOTAL	350	100

About 92 percent of the young-growth sawtimber stands are well stocked. In poletimber stands 67 percent is well stocked and 31 percent medium stocked. Thirty-seven percent of the seedling and sapling areas are well stocked and 53 percent medium stocked.

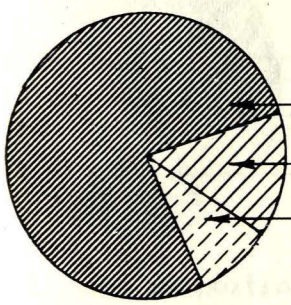
In classifying young-growth stands for stocking, all commercial tree species of all sizes are considered in determining the degree or class of stocking. Thus, a young-growth sawtimber stand may be classed as well stocked on the basis of sawtimber size trees, poletimber, seedlings and saplings, or any combination of these tree sizes.

COMMERCIAL FOREST LAND TIMBER VOLUMES

The net volume of live sawtimber trees (11.0 inches d.b.h. and larger) on the commercial forest land is estimated to be 2,102 million board feet, log scale, Scribner rule, or 2,296 million board feet, International ¼-inch rule. Of the total volume, 1,554 million board feet or 74 percent is in sawtimber stands; the remaining 546 million board feet is in scattered sawtimber trees in the overstory of poletimber and seedling and sapling stands.

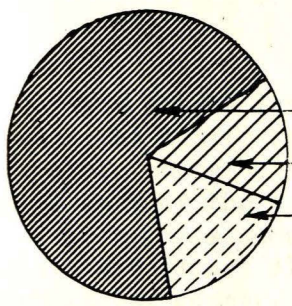
Species

The live sawtimber volume of softwood species totals 1,907 million board feet; the volume of hardwood species is 195 million board feet. The dominant species, Douglas-fir, accounts for three-fourths of the total volume in the county. Red alder is the dominant hardwood, making up almost half of the total hardwood volume.



SPECIES	MILLION BOARD FEET OF SAWTIMBER	PERCENT
DOUGLAS-FIR	1,612	77
OTHER SOFTWOODS	295	14
HARDWOODS	195	9
TOTAL	2,102	100

Almost 70 percent of the total volume of softwood sawtimber is in large sawtimber trees which are 21 inches or over in diameter. Of this volume 32 percent is in trees 41.0 inches or more in diameter, 22 percent in trees 31.0 to 40.9 inches, and 46 percent in trees 21.0 to 30.9 inches d.b.h.



SPECIES	MILLION CUBIC FEET OF GROWING STOCK	PERCENT
DOUGLAS-FIR	412	69
OTHER SOFTWOODS	84	14
HARDWOODS	100	17
TOTAL	596	100

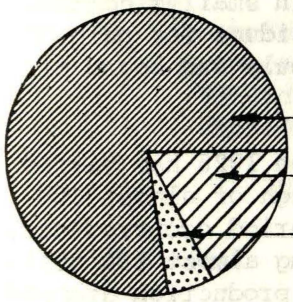
The percentage distribution of growing stock volume by species, which includes poletimber trees 5.0 to 10.9 inches in addition to sawtimber size trees 11.0 inches and larger, differs from the distribution for sawtimber volume. The large increase in percentage for hardwoods is indicative of the large volume of hardwood occurring in the poletimber size class.

FOREST OWNERSHIP

Commercial Forest Land

The ownership of commercial forest land is largely concentrated in private holdings. About one-third of the private land is in larger ownerships over 5,000 acres in size. The remaining two-thirds is held by about 2,000 owners. In the holdings of 5,000 acres or less the largest number of owners is in the smallest size class, 10 to 99 acres; the

the largest acreage occurs in the 100- to 500-acre size class. Only a small portion of the 274 thousand acres of forest land in private ownership is in sawtimber size stands. Eighty-six percent of the area is in poletimber and seedling and sapling stands with 13 percent in sawtimber stands.

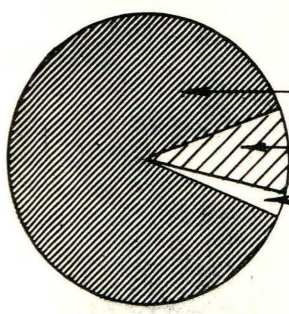


OWNERSHIP CLASS	THOUSAND ACRES	PERCENT
PRIVATE	274	78
STATE AND MUNICIPAL	61	17
FEDERAL	17	5
TOTAL	352	100

A large proportion of the publicly owned area is held by the State of Washington. Federal lands, of which Fort Lewis Military Reservation constitutes the major area, accounts for only a small percentage of the total forest area. The distribution of stand-size classes in the publicly owned lands is similar to that in private ownership. Almost 88 percent is in poletimber and seedling and sapling stands with only 12 percent in sawtimber stands.

Sawtimber Volume

Private forest land contains a greater sawtimber volume per unit of area than the public forest land. Private land, representing 78 percent of the area, contains 88 percent of the volume while public lands, making up 22 percent of the area, have only 12 percent of the volume. Most of this difference is accounted for by the fact that the private forest lands contain almost all of the high-volume large coniferous stands remaining in the county.



OWNERSHIP CLASS	MILLION BD. FT.	PERCENT
PRIVATE	1,852	88
STATE AND MUNICIPAL	198	9
FEDERAL	52	3
TOTAL	2,102	100

FOREST UTILIZATION

Logging began at an early date in Thurston County because of the accessibility of the forests to tidewater, high quality of the original timber, and favorable logging conditions. Almost all the old-growth stand has now been cut. Some areas already have been harvested more than once. Most of the older logged areas support young stands approaching sawlog size.

Logs are usually moved into Olympia where they are processed or from where they are shipped to other Puget Sound manufacturing centers. Several plywood plants and sawmills are located in or near Olympia; these industries use considerable volume of timber which comes by rail and water from points outside Thurston County in western Washington and Oregon. Sawmills of various capacities are found in smaller communities throughout the county. Pulpwood logs and plant residues for pulp manufacture generally are shipped by rail or water to pulp and board plants in nearby counties.

The production of logs in Thurston County since 1925 has varied from a low of 25 million board feet in 1942 to a high of almost 300 million board feet in 1929. The peak production period occurred early in the recorded log history of the county, averaging almost 200 million board feet a year from 1925 through 1938. In 1939 production dropped sharply and continued low through 1948. During that time the annual output of logs amounted to 55 million board feet. In 1949 production increased and from then through 1953 the average annual output was 112 million board feet.

Table 1.--Land area by major classes of land, 1954

Class of land	Area
	Acres
Forest:	
Commercial	352,210
Noncommercial:	
Productive-reserved	1,150
Unproductive	160
Total	353,520
Nonforest	114,080
Total, all classes	467,600

Table 2.--Area of commercial forest land by ownership and stand-size classes, 1954

Ownership class	Total	Saw-timber stands	Pole-timber stands	Seedling and sapling stands	Nonstocked areas
	Acres	Acres	Acres	Acres	Acres
Private	273,600	36,890	174,790	59,770	2,150
State	60,380	8,660	35,430	16,030	260
Municipal	690	40	470	180	
Federally owned or managed:					
Indian	1,410	60	1,310	40	
National forest	320	240	80		
Other 1/	15,810	720	9,850	5,240	
Total Federal	17,540	1,020	11,240	5,280	
All ownerships	352,210	46,610	221,930	81,260	2,410

1/ Ft. Lewis Military Reservation.

Table 3.--Area of commercial forest land by major forest type and stand-size class, 1954

Forest type	Total	Sawtimber stands		Pole-timber stands	Seedling and sapling stands	Non-stocked areas
		Large[1/]	Small[2/]			
	Acres	Acres	Acres	Acres	Acres	Acres
Douglas-fir	323,470	19,990	24,810	201,090	77,580	
Hemlock-Sitka spruce	1,730		80	800	850	
Lodgepole pine	120			40	80	
Hardwoods	24,480	40	1,690	20,000	2,750	
Nonstocked areas	2,410					2,410
Total	352,210	20,030	26,580	221,930	81,260	2,410

1/ 21 inches d.b.h. and larger.

2/ 11 to 21 inches d.b.h.

Table 4.--Land area by cover type, ownership class and land-use class, 1954

(Acres)

Cover type	Total all ownerships	Unreserved							Reserved		
		Total	Private	State	Municipal	Federally owned or managed: Indian	Federally owned or managed: National forest	Federally owned or managed: Other Federal	Total	State	Municipal
PRODUCTIVE FOREST LAND											
	Commercial								Noncommercial (productive-reserved)		
Douglas-fir large old-growth sawtimber (yellow fir)	2,100	2,100	2,100								
Douglas-fir small old-growth and large young-growth sawtimber (red fir)	17,990	17,730	16,710	760	20		240		260	120	140
Douglas-fir small young-growth sawtimber	25,350	24,810	16,220	7,810		60		720	540	450	90
Douglas-fir poletimber	201,320	201,010	158,370	32,590	380	900	80	8,690	310	120	190
Douglas-fir seedlings and saplings	77,580	77,580	57,120	15,240	180	40		5,000			
Western hemlock small sawtimber	80	80	80								
Western hemlock poletimber	800	800	320	480							
Western hemlock seedlings and saplings	850	850	420	430							
Western redcedar large sawtimber	160	160	160								
Western redcedar poletimber	80	80	80								
Lodgepole pine poletimber	40	40	40								
Lodgepole pine seedlings and saplings	80	80						80			
Hardwood large sawtimber	40	40	40								
Hardwood small sawtimber	1,730	1,690	1,580	90	20				40		40
Hardwood poletimber	20,000	20,000	15,980	2,360	90	410		1,160			
Hardwood seedlings and saplings	2,750	2,750	2,230	360				160			
Nonstocked area, recent clearcut	1,240	1,240	1,060	180							
Nonstocked area, old clearcut	1,090	1,090	1,010	80							
Nonstocked area, deforested burn	80	80	80								
Total	353,360	352,210	273,600	60,380	690	1,410	320	15,810	1,150	690	460
UNPRODUCTIVE FOREST LAND											
	Noncommercial										
Oak-madrone	160	160	160								
Total	160	160	160								
NONFOREST LAND											
Agricultural	97,450	97,450	94,700	500	230	70		1,950			
Grass and brush	2,620	2,620	2,440	80	100						
Open--nonvegetative	14,010	13,870	12,160	660	770			280	140	80	60
Total	114,080	113,940	109,300	1,240	1,100	70		2,230	140	80	60
ALL LAND											
Forest land											
Commercial	352,210	352,210	273,600	60,380	690	1,410	320	15,810			
Noncommercial (productive-reserved and unproductive)	1,310	160	160						1,150	690	460
Total forest land	353,520	352,370	273,760	60,380	690	1,410	320	15,810	1,150	690	460
Nonforest land	114,080	113,940	109,300	1,240	1,100	70		2,230	140	80	60
Total all land	467,600	466,310	383,060	61,620	1,790	1,480	320	18,040	1,290	770	520

Table 5.--Area of commercial forest land by forest-condition and ownership classes, 1954

Forest-condition class	Total	Private	State	Municipal	Federally owned or managed		
					Indian	National forest	Other Federal
	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Conifer large sawtimber							
Uncut	18,130	17,350	520	20		240	
Selectively cut	1,860	1,620	240				
Total	19,990	18,970	760	20		240	
Conifer small sawtimber							
Uncut	24,050	15,700	7,570		60		720
Selectively cut	840	600	240				
Total	24,890	16,300	7,810		60		720
Conifer poletimber							
On cutovers	197,730	158,240	29,440	380	900	80	8,690
On plantations	3,610	20	3,590				
On other	590	550	40				
Total	201,930	158,810	33,070	380	900	80	8,690
Conifer seedlings and saplings							
On cutovers	73,570	54,580	13,690	180	40		5,080
On plantations	4,740	2,760	1,980				
On other	200	200					
Total	78,510	57,540	15,670	180	40		5,080
Hardwoods Total	24,480	19,830	2,810	110	410		1,320
Nonstocked Total	2,410	2,150	260				
Total	352,210	273,600	60,380	690	1,410	320	15,810

Table 6.--Area of young-growth timber stands on commercial forest land by density-of-stocking class, species group, stand-size class, and nonstocked areas, 1954

Stocking class and species group	Total	Sawtimber		Poletimber	Seedlings and saplings	Nonstocked
		Large 1/ young growth	Small young growth			
	Acres	Acres	Acres	Acres	Acres	Acres
Well stocked:						
Softwoods	198,460	17,730	22,060	130,090	28,580	
Hardwoods	19,930		1,110	17,370	1,450	
Total	218,390	17,730	23,170	147,460	30,030	
Medium stocked:						
Softwoods	111,680		2,830	66,800	42,050	
Hardwoods	4,320		580	2,440	1,300	
Total	116,000		3,410	69,240	43,350	
Poorly stocked:						
Softwoods	12,920			5,040	7,880	
Hardwoods	190			190		
Total	13,110			5,230	7,880	
Nonstocked	2,410					2,410
All classes:						
Softwoods	323,060	17,730	24,890	201,930	78,510	
Hardwoods	24,440		1,690	20,000	2,750	
Nonstocked	2,410					2,410
Total	349,910	17,730	26,580	221,930	81,260	2,410

1/ Includes only the stands classified and mapped as Douglas-fir large young-growth sawtimber type.

Table 7.--Net volume of live sawtimber and growing stock on commercial forest land by ownership class, 1954

Ownership class	Sawtimber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet International ¼-inch rule	Million cubic feet
Private	1,852	2,019	501
State	195	217	74
Municipal	3	3	1
Federally owned or managed:			
Indian	4	4	2
National forest	17	19	3
Other 1/	31	34	15
Total Federal	52	57	20
All ownerships	2,102	2,296	596

1/ Ft. Lewis Military Reservation.

Table 8.--Net volume of live sawtimber and growing stock on commercial forest land by stand-size class, 1954

Stand-size class	Sawtimber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International ¼-inch rule	Million cubic feet
Sawtimber stands	1,554	1,676	308
Poletimber stands	546	618	286
Seedling and sapling stands	2	2	2
Nonstocked areas			
Total	2,102	2,296	596

Table 9.--Net volume of live sawtimber and growing stock on commercial forest land by species, 1954

Species	Sawtimber		Growing stock
	Million board feet, log scale, Scribner rule	Million board feet, International ¼-inch rule	Million cubic feet
Softwoods:			
Douglas-fir	1,612	1,756	412
Western hemlock	95	103	26
Western redcedar	142	151	46
True firs 1/	58	62	12
Total	1,907	2,072	496
Hardwoods:			
Red alder	97	112	62
Other 2/	98	112	38
Total	195	224	100
All species	2,102	2,296	596

1/ Most of this volume consists of grand fir.

2/ Most of this volume consists of bigleaf maple.

Table 10.--Net volume of live sawtimber on commercial forest land by diameter-class group, species group and log rule, 1954

Diameter class and log rule	Total	Douglas-fir	Other softwoods	Hardwoods
	- - - Million board feet - - -			
11.0" to 20.9" d.b.h.				
Scribner rule	720	461	100	159
International ¼-inch rule	825	535	107	183
21.0" to 30.9" d.b.h.				
Scribner rule	653	486	131	36
International ¼-inch rule	705	524	140	41
31.0" to 40.9" d.b.h.				
Scribner rule	298	264	34	
International ¼-inch rule	316	280	36	
41.0" d.b.h. and larger				
Scribner rule	431	401	30	
International ¼-inch rule	450	417	33	
All diameter classes				
Scribner rule	2,102	1,612	295	195
International ¼-inch rule	2,296	1,756	316	224

Table 11.--Net volume of all timber on commercial forest land by class of material and species group, 1954

Class of material	Total	Softwoods	Hardwoods
	Million cubic feet	Million cubic feet	Million cubic feet
Growing stock:			
Sawtimber trees:			
Sawlog portion	401	356	45
Upper stem portion	30	27	3
Total	431	383	48
Poletimber trees	165	113	52
Total growing stock	596	496	100
Other material:			
Sound cull trees	1	*	1
Rotten cull trees	6	2	4
Salvable dead trees	10	10	
Total other material	17	12	5
Total, all timber	613	508	105

* Less than 500 thousand.

Table 12.--Average annual cut from live sawtimber and growing stock on commercial forest land by species group for the period 1949-53 incl.

Species group	Sawtimber						Growing stock		
	Timber products	Logging residues	Annual cut 1/	Timber products	Logging residues	Annual cut 1/	Timber products	Logging residues	Annual cut 1/
	Thousand board feet, log scale, Scribner rule			Thousand board feet, International $\frac{1}{4}$-inch rule			Thousand cubic feet		
Softwoods	101,879	2,687	104,566	111,293	2,738	114,031	28,861	3,272	32,133
Hardwoods	10,446	276	10,722	11,411	281	11,692	2,959	336	3,295
Total	112,325	2,963	115,288	122,704	3,019	125,723	31,820	3,608	35,428

1/ Annual cut is the sum of timber products and logging residues.

FOREST SURVEY PROCEDURE

The procedures used in the second Forest Survey reinventory of Thurston County were materially different from the procedures used in the initial inventory and first reinventory. This change in procedures accounts for some significant differences in both the forest-area and timber-volume statistics obtained. Therefore, a brief description of each of the procedures seems desirable.

Initial Inventory

The initial inventory of the county was conducted in 1932-33 by what is known as the "compilation method." In this method existing information on forest types, timber cruises and logging records, and other pertinent data, were collected from private timber owners and various public agencies. These data were checked in the field for reliability, and were adjusted to the then existing specifications and standards of Forest Survey. Forest-type and timber-volume data for areas not covered by reliable existing information were obtained through field reconnaissance.

All land in the county was classified as either forest or nonforest. Forest land was further classified as commercial or noncommercial; the commercial was still further classified by forest type, stand-size or condition class, and in case of young growth, by stocking class. All such types and classes were mapped in place on 1-inch-to-the-mile base maps of each forested township. These township type maps were then superimposed over current ownership-status plats and dot counted to obtain forest-type-area statistics by ownership class. Type delineations on the township maps were traced to a base map of the county to form a county forest type map. The commercial forest land was also classified as to site quality, or forest productive capacity.

In-place, timber-volume estimates were based on existing cruises collected and adjusted to the Forest Survey standard, on field samples, and on ocular appraisals. Cruises made by commercial cruisers were obtained for most of the privately owned timber. Separate volume estimates were computed for each of the commercial tree species and for each ownership class. Methods used in this initial inventory did not permit a statistical computation of accuracy of the estimate.

First Reinventory

The first reinventory, in 1939, included a complete revision of the forest type map of the county. For this revision, records of cutting and other forms of drain, since the original inventory were obtained from various sources and verified in the field by ground reconnaissance. Areas on which the type had changed due to cutting,

restocking of cutover or burned-over land, and ingrowth of immature stands were remapped on the ground. The ownership status was brought up to date. On the basis of the new ownership data and the revised forest type map, area statistics by forest types were recomputed.

Timber volume estimates for old-growth sawtimber stands were based on cruise data collected during the original survey, adjusted for cutting and other drain. Volume estimates for immature stands were determined from yield tables adjusted for site, quality, age and density of stands.

Second Reinventory

In the second reinventory in 1954 the forest type map of the county was completely revised. This revision was accomplished through interpretation, classification, and field mapping on aerial photos which covered all of the county. In the delineation of types and conditions on aerial photos similar types were examined on the ground to ensure accuracy in interpretation. The presence of old and new roads through much of the forested area greatly facilitated these examinations. Types, stand-size classes, and stocking classes were similar to those recognized in the initial inventory. However, field mapping on aerial photos resulted in much greater accuracy and detail than was possible in the earlier inventory through ground reconnaissance alone. Type delineations on the aerial photos were transferred to a 2-inch scale county planimetric base map through use of a photo projector. The new type map was then superimposed over a current ownership-status map and a dot count made of forest type areas by ownership class.

Estimates of net volumes of live sawtimber, growing stock, rotten and sound cull, and salvable-dead material were developed by applying average-per-acre volumes to the appropriate forest type acreages. The per-acre volumes for stands of sawtimber and poletimber were obtained through a sampling procedure in which the stands were measured on randomly selected plots. Comparable sawtimber and poletimber per-acre volumes contained in scattered trees in the overstory of seedling and sapling stands and nonstocked areas were based on empirical estimates. In the random selection of samples each individual sawtimber or poletimber plot in the county had an equal chance to be chosen. A sample consisted of a series of three one-fifth-acre circular plots spaced at 6-chain intervals. Intensity of the sampling was designed to produce a total estimate of volume within a specified sampling accuracy.

ACCURACY OF 1954 REINVENTORY DATA

Forest Area

In the second reinventory of the county, in-place mapping of the forests and their classification by forest type, stand-size class, or condition class, were on the basis of 100-percent coverage. Thus no error due to sampling was involved. Errors due to techniques or judgment in the field and in office computation of data were possible, but difficult to evaluate. Throughout all phases of the work close supervision and frequent checks assured a high level of accuracy and uniformity of standards.

Timber Volume

The chances are 19 out of 20 that the board-foot volume of live sawtimber, if measured by a 100-percent cruise, would be within plus or minus 20.8 percent of the estimated total of 2,102 million board feet, log scale, Scribner rule. On the same basis, cubic-foot volume of growing stock from a 100-percent cruise would be within a range of plus or minus 16.7 percent of the estimated 596 million cubic feet. Volume estimates by species, stand-size class, or other subdivision have greater sampling errors.

DIFFERENCE IN RESULTS OF INVENTORIES

Some of the differences in forest-type and timber-volume statistics resulting from the initial inventory and first reinventory and those obtained in the second reinventory are due to actual physical change. Other differences are due to variations in procedures used, in interpretation and classification of forest conditions, and in standards of utilization. Because of these differences direct comparison of the statistics may not be meaningful except insofar as these differences are taken into account.

Forest Area

Forest-area statistics resulting from the three inventories are shown in the following table:

Inventory	Total forest land	Noncommercial 1/ unproductive	All other forest areas				
			Total	Sawtimber 2/	Poletimber 2/	Seedlings and saplings	Nonstocked
	Thousands of acres						
1932-33	354	*	354	84	59	75	136
1939	354	*	353	85	59	96	113
1954	354	*	353	48	222	81	2

* Less than 500 acres.

1/ Based on 1954 standards.

2/ 1932-33 and 1939 data adjusted to present stand-size class definition.

In the two earlier inventories the sawtimber acreage included stands 15.0" d.b.h. and larger; present standards include stands 11.0" d.b.h. and larger. Similarly the poletimber standards have been changed from 5.0"-15.0" d.b.h. to 5.0"-11.0" d.b.h. In addition, in 1932-33 and 1939 some of the areas were not differentiated between seedlings and saplings and poletimber. The above table was adjusted for these differences.

The seedling and sapling acreages for all three inventories include stands of trees from 0 to 4.9 inches d.b.h., but those for 1932 and 1939 do not include stands on areas clearcut in the prior 10 years that were restocked at time of the inventory; such land was included in the nonstocked class. The 1954 acreage does include the area of seedling and sapling stands on recently clearcut land, if trees were found to be established at time of the inventory. Adjustments for these factors have not been made in the above seedling and sapling and nonstocked classes.

Differences within the commercial forest land area of stand-size classes reflect in part both real changes, such as those brought about by logging or growth, as well as difference brought about by changes in the survey procedure and specifications. In any event, it is apparent (1) there has been no appreciable change in the total forest area or the noncommercial unproductive area, (2) the sawtimber area has been reduced very materially, (3) there has been a large increase in the poletimber area due in part to ingrowth from younger age classes, and (4) with limited exceptions reproduction has been established on recent cutovers, on areas cut over between 1929 and 1939, and other areas previously classified as nonstocked.

Timber Volume

The three estimates of sawtimber volume are shown in the tabulation below:

Inventory	Total	Douglas-fir	Other conifers	Hardwoods
	Millions of board feet, log scale, Scribner rule			
1932-33 1/	2,500	2,200	300	*
1939 1/	1,600	1,500	100	*
1954	2,100	1,600	300	200

* Less than 50.

1/ Volume estimates adjusted to same d.b.h. and top diameter limits as were used in 1954.

The 1932-33 volume estimate was based on adjusted private cruises of the old-growth timber and yield table values for young timber. The 1939 figures were determined by adjusting the 1933 information and bringing it up to date. A completely new independent estimate was made in 1954 as described on page 18.

Some differences in volume estimates between 1933 and 1954 are due to differences in survey techniques, procedures and methods. The exact extent of the effects of survey methods on volume estimates cannot be measured.

However, it appears that the period of greatest logging activity which extended through 1938 is largely responsible for the substantial reduction of conifer sawtimber volumes between the initial inventory and the first reinventory. Estimates show about a 35 percent reduction in volume between 1933 and 1939. Log production figures for the period 1933-38 inclusive total over one billion board feet. In contrast, during the ensuing 6-year period production dropped to less than one-fourth of that volume.

These drain figures were offset, at least in part, by forest growth, both increment on sawtimber trees and advancement of smaller trees into the sawtimber class.

DEFINITION OF TERMS USED

Land Area

Total Land Area

Includes dry land and unmeandered water surface.

Forest Land Area

Includes (a) land which is at least 10-percent stocked by trees of any size and capable of producing timber or other wood products,

or of exerting an influence on the climate or on the water regime; and (b) land from which the trees described in "(a)" have been removed to less than 10-percent stocking and which has not been developed for other use. Minimum area of forest land recognized in reinventory of the county is 10 acres.

Nonforest Land Area

Land that does not qualify as forest land. Minimum area recognized in the reinventory of the county is 10 acres.

Forest Land Classes

Commercial Forest Land Area

Forest land which is producing, or is physically capable of producing, usable crops of wood, economically available now or prospectively, and not withdrawn from timber utilization.

Noncommercial Forest Land Area

Forest land (a) withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land, and (b) incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Types

Forest Land Types

Forest land is typed on the basis of predominant species as indicated by cubic volume for sawtimber and poletimber stand, and number of trees for seedling and sapling stands, or as a forest condition such as nonstocked cutover, or burned-over land. Where none of the indicated species comprises 50 percent or more of a given stand, the stand is typed on the basis of plurality of cubic volume or number of trees. In classifying forest land by type the minimum area recognized is 40 acres.

Commercial Forest Land

Major forest types. Local forest types are grouped into generalized types. The major forest types in Thurston County are as follows:

Douglas-fir. Forests in which 50 percent or more of the stand is Douglas-fir.

Hemlock-Sitka spruce. Forests in which 50 percent or more of the stand is hemlock or Sitka spruce.

Lodgepole pine. Forests in which 50 percent or more of the stand is lodgepole pine.

Hardwood. Forests in which 50 percent or more of the stand is red alder, bigleaf maple, Oregon white oak, or other western hardwoods, singly or in combination.

Noncommercial Forest Land

Productive-reserved. Forest land withdrawn from timber utilization through statute, ordinance, or administrative order, but which otherwise qualifies as commercial forest land.

Unproductive. Forest land incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Nonforest Land Types

Agricultural. Cultivated land or stump pasture.

Grass and brush. Grass or brush on nonforest land.

Open-nonvegetative. Includes barrens, tideflats, towns, and unmeandered water.

Tree Classes

Sawtimber Tree

Tree of commercial species, 11 inches d.b.h. or larger, that contains at least one 16-foot coniferous sawlog or one 8-foot hardwood sawlog to a variable top diameter never less than 8 inches inside the bark. Also, 25 percent or more of the gross board-foot volume must be free from rot or defect.

Poletimber Tree

Softwood or hardwood tree 5.0 to 10.9 inches d.b.h. of commercial species in which 25 percent or more of the gross cubic-foot volume is free from rot and defect.

Seedling and Sapling Trees

Live trees of commercial species less than 5.0 inches d.b.h. and of good form and vigor.

Cull Tree

Live tree of sawtimber or poletimber size that is unmerchantable, now or prospectively, because of defect, rot, or species.

Sound cull tree. Live tree of sawtimber or poletimber size which contains 25 percent or more of sound volume but will not make at least one merchantable log, now or prospectively, because of roughness or poor form.

Rotten cull tree. Live tree of sawtimber or poletimber size in which less than 25 percent of the total volume is sound.

Salvable Dead Tree

Standing dead or down tree which contains 25 percent or more of sound volume and at least one merchantable 16-foot coniferous or 8-foot hardwood log.

Stand-Size Classes

Sawtimber Stand

Stand of sawtimber trees having a minimum net volume per acre as follows: 5,000 board feet, log scale, International ¼-inch rule, in any species except hardwoods; 1,500 board feet in hardwoods.

Large sawtimber stand. Stand in which the majority of the volume is in trees more than 21.0" d.b.h.

Small sawtimber stand. Stand in which the majority of the volume is in trees from 11.0" to 20.9" d.b.h.

Poletimber Stand

Stand failing to meet sawtimber-stand specifications but at least 10-percent stocked with poletimber and larger (5.0" d.b.h. and larger) trees and at least half the minimum stocking in poletimber trees.

Seedling and Sapling Stand

Stand not qualifying as either sawtimber or poletimber stand but having at least 10-percent stocking of trees of commercial species and with at least half the minimum stocking in seedling and sapling trees.

Uncut Sawtimber Stand

Sawtimber stand that is essentially undisturbed by cutting.

Selectively Cut Sawtimber Stand

Sawtimber stand in which a partial harvest has been made, and in which the residual volume amounts to 5,000 board feet or more per acre.

Stocking

Stocking is the extent to which growing space is effectively utilized by present or potential growing stock trees of commercial species. "Degree of stocking" is synonymous with "percent of growing space occupied" and means the ratio of actual stocking to full stocking for comparable sites and stands. Stocking may be measured in terms of number of trees, volume, basal area, cover canopy, or other criterion, or combination of criteria.

Well-stocked stands. Stands that are 70 percent or more stocked with present or potential growing stock trees.

Medium-stocked stands. Stands that are 40 to 69 percent stocked with present or potential growing stock trees.

Poorly stocked stands. Stands that are 10 to 39 percent stocked with present or potential growing stock trees.

Nonstocked areas. Areas that are 0 to 10 percent stocked with present or potential growing stock trees.

Timber Volume

Live Sawtimber Volume

Net volume in board feet of live sawtimber trees of commercial species.

Scribner rule. The common board-foot rule used in determining log-scale volume of sawtimber in the Pacific Northwest.

International ¼-inch rule. The standard board-foot rule adopted nationally by the Forest Service in the presentation of Forest Survey volume statistics.

Growing Stock

Net volume in cubic feet of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) inside bark.

All-Timber Volume

Net volume in cubic feet of live and salvable dead sawtimber trees and poletimber trees of commercial species, and cull trees of all species from stump to a minimum 4.0-inch top inside bark.

Tree Species

Tree species commonly found in Thurston County include:

Softwoods:
- Douglas-fir (*Pseudotsuga menziesii*)
- Western hemlock (*Tsuga heterophylla*)
- Western redcedar (*Thuja plicata*)
- Lodgepole pine (*Pinus contorta*)
- Grand fir (*Abies grandis*)
- Pacific silver fir (*Abies amabilis*)

Hardwoods:
- Red alder (*Alnus rubra*)
- Bigleaf maple (*Acer macrophyllum*)
- Oregon ash (*Fraxinus latifolia*)
- Black cottonwood (*Populus trichcocarpa*)
- Pacific Madrone (*Arbutus menziesii*)

Timber Cut

Annual Cut of Live Sawtimber

The net board-foot volume of live sawtimber trees cut or killed by logging on commercial forest land during a specified year.

Timber products from live sawtimber. The volume of timber products cut from live sawtimber.

Logging residues from live sawtimber. The net board-foot volume of live sawtimber trees cut or killed by logging on commercial forest land and not converted to timber products.

Annual Cut of Growing Stock

The net cubic-foot volume of live sawtimber and poletimber trees cut or killed by logging on commercial forest land during a specified year.

Timber products from growing stock. The volume of timber products cut from growing stock.

Logging residues from growing stock. The net cubic-foot volume of growing stock cut or killed by logging on commercial forest land and not converted to timber products.